AKIMAKINA, L.V.; BODROVA, M.D.; IVANOV, S.P.; IVCHENKO, D.F.

Comparative study of the British "Series 600" grid camera manufactured by Thompson and the Soviet [illegible] camera. Usp.nauch.fot. 9:29-32 '64.

(MIRA 18:11)

AKIMAKINA, L.V.; IVANOV, S.P.; IVCHENKO, D.F.; SKOROBOGATOV, P.K.

Use of SK4-1 cameras for stereoscopic filming with a variable basis. Usp.nauch.fot. 9:37-39 '64.

(MIRA 18:11)

AKIMCHENKO, I.P.

137-58-4-6982

Translation from: Referativnyy zhurnal, Metallurgiya, 1958, Nr 4, p 96 (USSR)

AUTHORS: Petrov, D. A., Shashkov, Yu. M., Akimchenko, I. P.

TITLE: Diffusion of Antimony and Germanium in Silicon (Diffuziya sur'my i germaniya v kremnii)

PERIODICAL: V sb.: Vopr. metallurgii i fiz. poluprovodnikov. Moscow, AN SSSR, 1957, pp 130-132

ABSTRACT: The radioactive isotopes Sb^{124} and Ge^{71} were used to determine the coefficient of diffusion D of Sb and Ge in Si. Diffusion was performed in large crystalline specimens having resistivities of tenths of an ohm/cm. These were of the p-type, cut transversely from bars obtained by extraction from the melt by the Chokhral'skiy method. A thin layer of Sb^{124} and Ge^{71} was sprayed on the specimens in vacuum. Annealing was performed in quartz ampoules filled with Ar, these in turn being housed in evacuated ampoules. The temperature of annealing was maintained to within $\pm 5^{o}$. Distribution of the concentrations of the diffused elements through the specimen was determined by the radioactivity of the abraded layer and the radioactivity of the specimen. It was found that the D_{Sb} at 940-1300° could be described by the equation:

Card 1/2

137-58-4-6982

Diffusion of Antimony and Germanium in Silicon

0.112 exp(-66,000/RT) cm^2/sec and the D_{Ge} at 1150-1350° by the equation: $6.26 \cdot 10^5$ exp (-121,820/RT) cm^2/sec.

Yu. Sh.

1. Antimony--Germanium--Diffusion 2. Silicon--Applications

Card 2/2

24.7100
24.7500
~~24 (7)~~

66168

AUTHORS: Shashkov, Yu. M., Akimchenko, I. P. SOV/20-128-5-20/67

TITLE: Diffusion of Lithium Into Silicon

PERIODICAL: Doklady Akademii nauk SSSR, 1959, Vol 128, Nr 5, pp 937-939 (USSR)

ABSTRACT: The preparation of monocrystalline silicon alloyed with lithium became interesting. Owing to the chemical aggressiveness of lithium the diffusion of lithium into monocrystalline silicon presents the most suitable method of producing the alloy. This is also favored by the large value of the coefficient of the diffusion of lithium into silicon. The distribution of the admixture in the sample can be calculated with sufficient accuracy provided the diffusion coefficient of the admixture in the sample is known. Reference is made to a number of pertinent preliminary papers. It was of interest to examine existent data on the diffusion coefficient of lithium into silicon as a function of the perfection of the silicon crystals. This problem is also of theoretical interest. The dependence of the coefficient of the diffusion of lithium into silicon on the number of structural deficiencies in the crystal may be regarded as a criterion proving diffusion to proceed along the interspaces between the lattice nodes as

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Diffusion of Lithium Into Silicon

well as verifying the mechanism of the dependence of the diffusion coefficient on the degree of structural perfection. In doing so, the existence of atoms between the lattice nodes and of substituting atoms is assumed. Substitution took place out of a thin sheet of metallic lithium applied to the surface of the sample after this had been cut and etched with an aqueous KOH solution. The upper side of the lithium sheet was then covered by a second sample. The execution of the experiments is briefly described. 2 Types of samples were used for these experiments, differing widely in the number of grooves formed in the etching process. They are purely monocrystalline and contain a great number of twins and dislocations. In the latter case diffusion took place perpendicular and parallel to the extension of the twins and dislocations. The samples were cut out of cast pieces, which had been prepared by a special method. A table listing the following data is included: characteristic properties of the samples, their resistance, the temperatures of diffusion-annealing, and the values obtained for the diffusion coefficient. These values are illustrated by a diagram on the coordinates

Diffusion of Lithium Into Silicon

logD - 1/T. The experimental points on this curve form a straight line, which for the temperature interval 400 to 800° may be defined by the equation $D = 2.2.10^{-3}\exp(-16200/RT)$ $cm^2/sec.$ The data given in the papers by Fuller, Severiens, et al (Refs 1, 2) are in good agreement with results obtained in the present investigation. The data obtained by the present investigation indicate that the diffusion rate of lithium is independent of the structural perfection of the silicon crystals. This confirms that lithium diffuses through the interspaces between the nodes only. Furthermore, this data indicates the validity of the mechanism of the dependence of the diffusion rate on the structural perfection of the crystals, according to which diffusion proceeds at the lattice nodes and also in between. There are 2 figures, 1 table, and 6 references, 1 of which is Soviet.

ASSOCIATION: Institut metallurgii im. A. A. Baykova Akademii nauk SSSR (Institute of Metallurgy imeni A. A. Baykov of the Academy of Sciences, USSR)

4

66168

Diffusion of Lithium Into Silicon SOV/20-128-5-20/67

PRESENTED: May 27, 1959, by I. P. Bardin, Academician

SUBMITTED: April 30, 1959

4

Card 4/4

84071
S/181/60/002/009/012/036
B004/B056

9.4300 (1035, 1138, 1143)

AUTHORS: Akimchenko, I. P., Milevskiy, L. S.

TITLE: The Diffusion of Antimony in Germanium Alloyed With Aluminum

PERIODICAL: Fizika tverdogo tela, 1960, Vol. 2, No. 9, pp. 2109 - 2116

TEXT: The authors discuss the results obtained by some papers published on the diffusion of impurities in germanium (Refs. 1-5). B. I. Boltaks (Ref. 5) determined the "Diffusion Isothermal Lines" for the diffusion of antimony in germanium alloyed with antimony. The present paper aimed at determining the diffusion isothermal lines for antimony, in which case, however, the Ge was alloyed with an acceptor, viz., aluminum. p-type Ge crystals produced by M. Ya. Dashevskiy and having an aluminum content of $N_a = 2.4 \cdot 10^{14}$, 2.10^{16}, 4.10^{17}, and 3.10^{18} atom/cm^{-1} were used. The Hall effect and resistivity were measured in these samples, and the type of conductivity was determined, the concentration p of the carriers being put equal to N_a. The samples were polished by means of M20 (M20)

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and M10 (M10) SiC powder, purified, and annealed together with a 1% Ge-Sb alloy in quartz ampoules evacuated to 10^{-3} torr. Annealing temperatures were between 650 and 930°C, and annealing lasted from 2 to 5 days, so that deep penetration of Sb 50 - 300 μ was made possible. In consequence of the diffusion of Sb, a p-n junction occurred at the place where Sb concentration became equal to that of Al, from the position of which the diffusion coefficient D was calculated: $D = x^2/A4t$ cm^2/sec (4) (x = depth of the p-n junction, t = duration of the annealing, A = a constant which was determined for each alloy and temperature). x was determined a) by polishing one side of the sample at angles of 2, 4, or 6°, checked by means of a МИМ-6 (MIM-6) microscope, and by recording the current-voltage characteristic; b) by polishing plane-parallel layers, recording the current-voltage characteristic, and measuring the thermo-emf; c) measuring the resistivity by means of a probe according to Refs. 6,7. The values for x obtained by this method are given in a table. Samples annealed under the same conditions but without the Sb-Ge alloy proved that the thickness of the layer from which Al evaporated, was less by one order of magnitude than x. The results obtained for the four

The Diffusion of Antimony in Germanium Alloyed With Aluminum

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S/181/60/002/009/012/036
B004/B056

Ge samples with different Al contents are represented in Figs. 1-4 as $\log D = f(1/T)$. The following was found: $D = D_o \exp(-\Delta E/RT)$. In Fig. 5, $\log D_o = f(\log N_a)$, and in Fig. 6, $\Delta E = f(\log N_a)$ is represented. Fig. 7 shows the diffusion isothermal lines $\log D = f(\log p)$ for 748°, 800°, 840°, and 883°C. At lower temperatures, N_a exerts no influence upon D up to about 10^{17} cm^{-3}; at 10^{18} cm^{-3}, D quickly becomes smaller. At higher temperatures, D has a maximum at $N_a \sim 10^{17}$ cm^{-3}, which is followed by a drop at $N_a \sim 10^{18}$ cm^{-3}. The increase of D between $N_a = 10^{14}$ and $N_a = 10^{17}$ cm^{-3} is explained by an internal electric field which forms as a consequence of the high concentration gradient of the impurity diffused in: $E_i = (kT/e)(1/C_{Sb})(\partial C_{Sb}/\partial x)$ (8). C_{Sb} is the concentration of antimony and a function of x. At higher temperatures, D is decreased because of intrinsic conductance. There are 7 figures, 1 table, and 10 references: 3 Soviet, 5 US, 1 British, and 1 Czechoslovakian.

X

Card 3/4

84071

The Diffusion of Antimony in Germanium Alloyed with Aluminum

S/181/60/002/009/012/036
B004/B056

ASSOCIATION: Institut metallurgii im. A. A. Baykova AN SSSR, Moskva (Institute of Metallurgy imeni A. A. Baykov of the AS USSR, Moscow)

SUBMITTED: April 29, 1959 (initially)
March 5, 1960 (after revision)

IX

Card 4/4

L 13030-63 EWT(1)/EWG(k)/EWP(q)/EWT(m)/BDS/EEC(b)-2 AFFTC/
ASD/ESD-3 Pz-4 JD/AT
ACCESSION NR: AP3000524 S/0181/63/005/005/1417/1422

AUTHOR: Akimchenko, I. P.; Vavilov, V. S.; Plotnikov, A. F.

TITLE: Spectra and kinetics of photoconductivity associated with simple structural defects in single crystals of germanium

SOURCE: Fizika tverdogo tela, v. 5, no. 5, 1963, 1417-1422

TOPIC TAGS: photoconductivity, capture cross section, vacancy, interstitial, Ge, Au

ABSTRACT: The authors have investigated the photoconductivity associated with deep levels of radiation effects arising during bombardment by electrons (1 mev) of very pure single crystals of Ge and of single crystals alloyed with Au. They conclude that a detected level of E sub V + 0.42 ev, belongs to an interstitial atom. The capture cross section corresponding to relaxation at the latter level was computed to be 3 times 10 sup -17 Sq/cm. From this value the effectiveness of inserting centers and the results fell within the limits of experimental error. "In conclusion the authors consider it their pleasant duty to express thanks to M. I. Iglitsyn for discussing the results, and to M. I. Ginzburg and G. P. Proshko for supplying the single crystals of germanium." Orig. art. has: 10 figures.

Card 1/2 Association: Inst. of Physics, Academy of Sciences, SSSR

ACCESSION NR: AP4039659 S/0181/64/006/006/1718/1723

AUTHOR: Akimchenko, I. P.; Vavilov, V. S.; Plotnikov, A. F.

TITLE: Some data on radiation defects obtained through investigations of photoconductivity spectra of germanium irradiated with fast electrons

SOURCE: Fizika tverdogo tela, v. 6, no. 6, 1964, 1718-1723

TOPIC TAGS: radiation defects, fast electron irradiation, p type germanium, n type germanium, germanium, fast electron irradiated germanium, germanium photoconductivity spectrum, irradiated germanium photoconductivity spectrum, forbidden zone

ABSTRACT: The following types of Ge single crystals have been irradiated by fast electrons with energies ~1 Mev at room temperature: (a) n-type with initial resistivities ρ of 3 and 56 ohm·cm; (b) dislocationless n-type, $\rho \sim 3$ ohm·cm; (c) p-type with a residual impurity concentration of 10^{11} to 10^{13} at/cm^3. The ohmic contacts were realized by the deposition of colloidal graphite. Photoconductivity spectra were measured at ~100K in the 1.7 to 10 μ wavelength range.

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ACCESSION NR: AP4039659

In the irradiated specimens the Fermi level was located 0.10 to 0.17 ev below the bottom of the conduction band. Some of the conclusions drawn from the results of the investigation are: 1) following irradiation with a flux of 6×10^{15} el/cm^2, the photoconductivity spectra of n-type specimens showed the occurrence of a structure which can be connected with electron transitions from local levels $E_c - 0.33$, $E_c - 0.37$ and $E_c - 0.43$ ev to the conduction band. When the total electron flux is increased to 3×10^{16} el/cm^2 the specimen acquires characteristics of p-type Ge; 2) spectra of type (b) specimens show that vacancy concentration increases almost proportionally with increased flux and that at a certain value of the electron flux there is an increase (by almost one order of magnitude) in the concentration of centers which yield a constant distribution of photoconductivity signals in the 2.5—1.9 μ wavelength range; 3) a new maximum was detected in the spectra of type (c) specimens which occurred in the presence and disappeared in the absence of bias lighting from the region of natural absorption; 4) at wavelengths up to 5 μ, the spectra of type (c) specimens showed a build-up of signals connected with electron transition to level $E_v + 0.33$ ev in the presence of a Ge filter; when no filter was used a maximum appeared at a wavelength of 3.15 μ;

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ACCESSION NR: AP4039659

5) in nonirradiated type (c) specimens the disturbance which introduces level $E_v + 0.33$ ev is due to copper atoms, while in the irradiated type (c) specimens it is due to the joint action of copper atoms and vacancies; 6) for the irradiated (c) specimens the hole-capture cross-section of level $E_v + 0.33$ ev is at 100°K 5×10^{-19} cm^2.

Orig. art. has: 9 figures.

ASSOCIATION: Fizicheskiy institut im. P. N. Lebedeva AN SSSR, Moscow (Physics Institute, AN SSSR)

SUBMITTED: 28Dec63 DATE ACQ: 19Jun64 ENCL: 00

SUB CODE: NP NO REF SOV: 007 OTHER: 000

Card 3/3

L 23310-66 EWT(m)/EWP(t) IJP(c) JD

ACC NR: AP6012480 SOURCE CODE: UR/0181/66/008/004/1168/1175

AUTHOR: Akimchenko, I. P.; Ginzburg, M. I.; Plotnikov, A. F.

ORG: Physics Institute im. P. N. Lebedev AN SSSR, Moscow (Fizicheskiy institut AN SSSR)

TITLE: Spectra and kinetics of photoconductivity of p- and n-type germanium crystals irradiated with fast electrons at 100 and 5.2K

SOURCE: Fizika tverdogo tela, v. 8, no. 4, 1966, 1168-1175

TOPIC TAGS: photoconductivity, irradiation effect, irradiation damage

ABSTRACT: An investigation was made of the photoconductivity spectra of p- and n-type Ge crystals with a concentration of residual impurities not higher than 8×10^{12} cm^{-3}, irradiated with fast electrons at 100K and 5.2K. The thickness of the specimens, 0.4 mm, permitted homogeneous distribution of defects at electron energies of 1 Mev. The investigations at 5.2K were carried out in a helium cryostat. The irradiation of crystals and the investigation of photoconductivity spectra were accomplished without exposing the crystals to air after irradiation. Photoconductivity spectra were taken in the wave range from 1.5 to 15 μ on d-c and a-c current. N-type Ge with intrinsic conductivity was transformed into p-type following irradiation with an electron flux of $\sim 10^{15}$ el/cm^2 and higher at 100K. Defects of the same nature were introduced into transformed n- as well as p-type material, causing

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L 23310-66

ACC NR: AP6012480

$E_v + 0.36$, $E_v + 0.42$, and $E_v + 0.62$ ev levels to appear. Irradiation at 5.2K introduced defects into n- and p-type crystals, leading to the appearance of $E_v + 0.22$, $E_v + 0.36$, $E_v + 0.42$, and $E_v + 0.62$ ev levels. The cross sections of hole capture for $E_v + 0.22$, $E_v + 0.36$, and $E_v + 0.42$ levels were 3×10^{-14}, 2.5×10^{-15}, and 8×10^{-16} cm^2, respectively. The comparison of δ_p for the $E_v + 0.36$ and $E_v + 0.42$ ev levels obtained at 100 and 5.2K shows that when temperature decreases δ_p increases. The author thanks V. S. Vavilov for the attention given the work and for discussing the results. Orig. art. has: 7 figures. [JA]

SUB CODE: 20/ SUBM DATE: 09Sep65/ ORIG REF: 005/ OTH REF: 004/ ATD PRESS: 4236

YEGOROV, K.D., kand.ekon.nauk; TROSHINA, A.P.; KOVALEV, P.P.; NOVIKOVA, A.A.; LAGUTINA, M.V.; VOLNINA, N.A.; SHESTAKOVA, R.V.; AKIMCHENKO, O.Ye.; KULEBAKIN, V.S., akademik, red.; VEYTS, V.I., red.; BUTENKO, A.F., kand.filosof.nauk, red.; RYBINSKIY, M.I., red.; CHASHNIKOVA, M.V., red.; NIZHNYAYA, S., red.; VOSKRESENSKAYA, T., red.; CHEKHUTOVA, V., red.; RKLITSKAYA, A.D., red.; CHEPELEVA, O., tekhn.red.

[Works of the State Commission for the Electrification of Russia; documents and materials] Trudy Gosudarstvennoi komissii po elektrifikatsii Rossii GOELRO; dokumenty i materialy. Red.komissiia: V.S.Kulebakin and others. Moskva, Izd-vo sotsial'no-ekon.lit-ry, 1960. 306 p. (MIRA 14:2)

1. Russia (1917- R.S.F.S.R.) Gosudarstvennaya komissiya po elektrifikatsii Rossii. 2. Chlen-korrespondent AN SSSR (for Veyts). (Electrification)

AKIMCHEV, S.P.

Distribution and natural regeneration of the Caucasian linden tree (Tilia caucasica Rupr.) on the northern slopes of the Adzhar-Imeretian Range. Trudy Inst. lesa AN Gruz. SSR 8:223-226 '58.
(MIRA 12:10)

(Adzhar-Imeretian Range--Linden)

AKIMENKO, A. D.

PA 23T26

USSR/Engineering Sep 1947
Boilers
Fuel Conservation

"Installation of a 'Steam-Air' Output Gauge," A. D. Akimenko, Krasnoye Sormovo Factory, 2½ pp

"Za Ekonomiyu Topliva" Vol IV, No 9

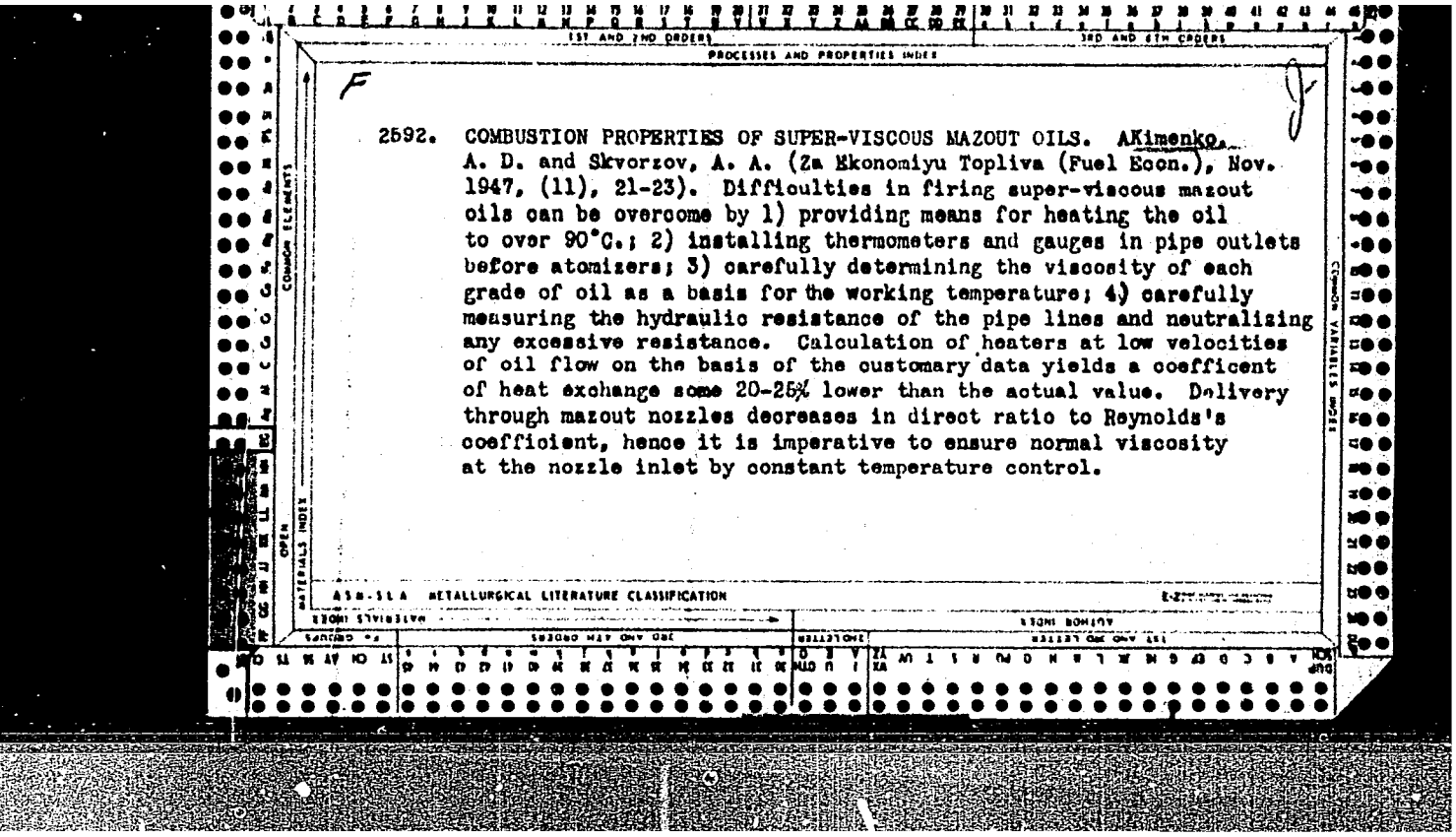
This apparatus carried out measurement and registration of steam output of boilers and gas resistance of air heaters of boilers simultaneously. The article states the mathematical formula on which this apparatus operates. Discusses the effect of the steam factors and the temperature of the emitted gases, and the load of the boiler on this measuring equipment.

23T26

USSR/Engineering (Contd) Sep 1947
Boilers
Fuel Conservation

This apparatus permits the stoker to operate his boiler at optimum efficiency.

23T26



F

2692. COMBUSTION PROPERTIES OF SUPER-VISCOUS MAZOUT OILS. AKimenko, A. D. and Skvorzov, A. A. (Za Ekonomiyu Topliva (Fuel Econ.), Nov. 1947, (11), 21-23). Difficulties in firing super-viscous mazout oils can be overcome by 1) providing means for heating the oil to over 90°C.; 2) installing thermometers and gauges in pipe outlets before atomizers; 3) carefully determining the viscosity of each grade of oil as a basis for the working temperature; 4) carefully measuring the hydraulic resistance of the pipe lines and neutralizing any excessive resistance. Calculation of heaters at low velocities of oil flow on the basis of the customary data yields a coefficent of heat exchange some 20-25% lower than the actual value. Delivery through mazout nozzles decreases in direct ratio to Reynolds's coefficient, hence it is imperative to ensure normal viscosity at the nozzle inlet by constant temperature control.

AKIMENKO, A. D.

USSR/Engineering
Compressed Air
Mathematics - Applied

Nov/Dec 1947

"Energy Effect of the Lowering of the Pressure of Compressed Air in the General Circuit of a Machinery Constructing Factory," A. D. Akimenko, "Krasnoye Sormov" Factory, 2 pp

"Promyshlennaya Energetika" No 11/12

Mathematical formulas accompany a discussion of the effects of the lowering of compressed air pressure. It is claimed that a lowering of the pressure results in greater economy of electric power, but only when the air expended by pneumatic machinery does

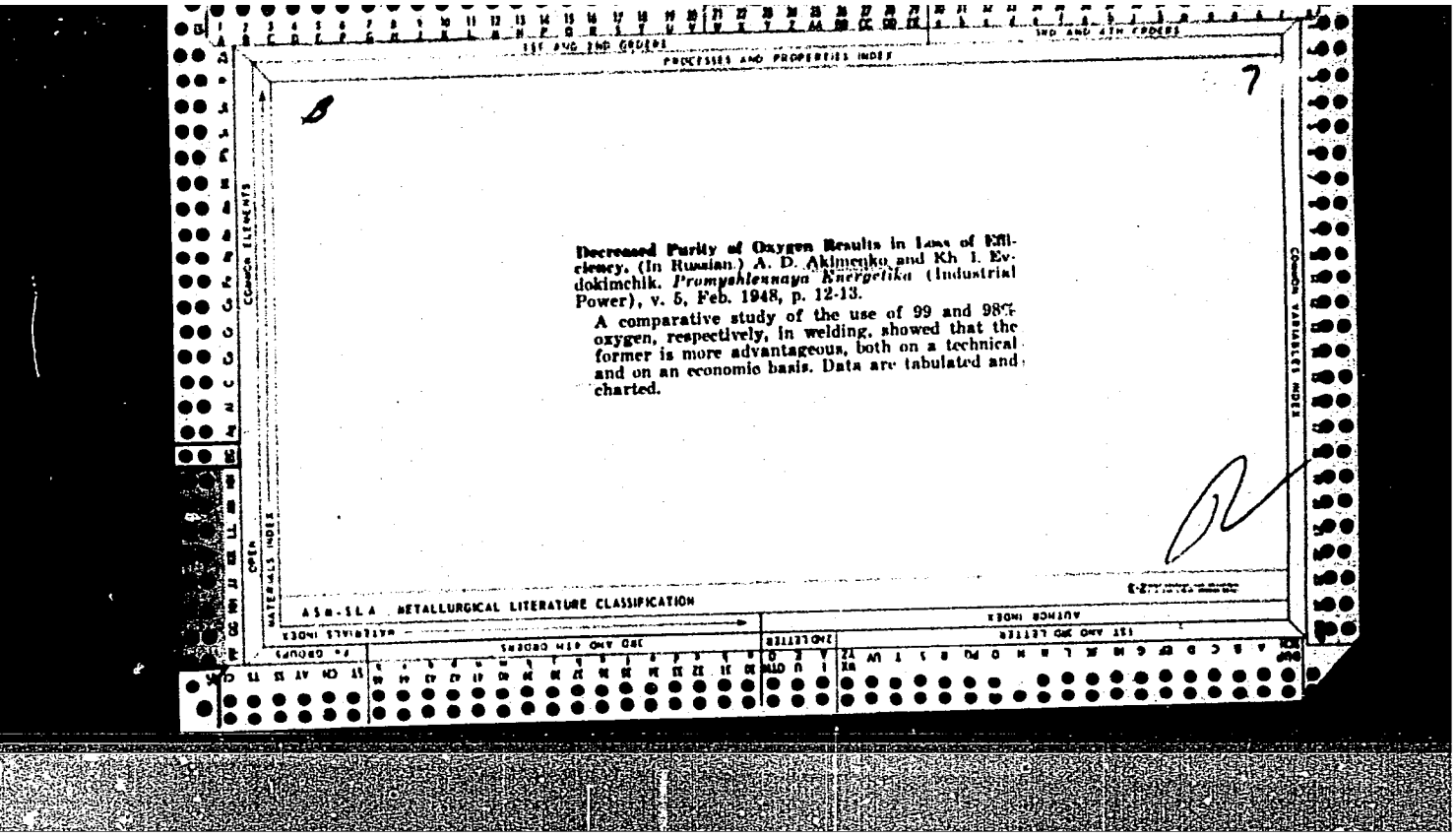
23T65

USSR/Engineering (Contd)
Compressed Air
Mathematics - Applied

Nov/Dec 1947

not exceed the determined amount. When the expenditure rises to 40 percent above the determined, however, it results in a great overexpenditure of electric power.

23T65



Decreased Purity of Oxygen Results in Loss of Efficiency. (In Russian.) A. D. Akimenko and Kh. I. Evdokimchik. *Promyshlennaya Energetika* (Industrial Power), v. 5, Feb. 1948, p. 12-13.

A comparative study of the use of 99 and 98% oxygen, respectively, in welding, showed that the former is more advantageous, both on a technical and on an economic basis. Data are tabulated and charted.

AKIMENKO, A.D.

Akimenko, A.D. "Experiment on the use of liquid oxygen imported over a long distance," Kislorod, 1948, No. 5, p. 44-45

SO: U-2888, Letopis Zhurnal'nykh Statey, No. 1, 1949

AKIMENKO, A. D.

PA 54/49T49

USSR/Engineering
Fuel Conservation
Preheater

Nov 48

"Results of Utilizing a Film Preheater," A. D. Akimenko, "Krasnoye Sormovo" Factory, 4 pp

"Energet Byul" No 11

A film preheater having a rated output of 4 megacalories/hr with a heating surface of 30 sq m constructed by All-Union Thermal Eng Inst was installed in the factory in 1946. This was the second installation in the USSR of a film preheater for using the heat of exhaust steam, and the first time the preheater was

[redacted] 54/49T49

USSR/Engineering (Contd)

Nov 48

used to superheat feed water. Exploitational indexes show it is fully suitable for superheating feed water.

[redacted] 54/49T49

AKIMENKO, A. D.

PA 30/49T70

USSR/Engineering Dec 48
Open-Hearth Furnaces
Fuel - Conservation

"Heat Utilization of Waste Water From Open-Hearth Furnaces," A. D. Akimenko, P. G. Sedov, Engineers, "Krasnoye Sormovo" Factory, 1 3/4 pp

"Prom Energet" No 12

Describes method in detail, giving figures for power saving, graph, and two pipe-line diagrams.

30/49T70

AKIMENKO, A. D.

PA 64/49T58

USSR/Engineering Dec 48
Heating Equipment
Industrial Efficiency

"The Reason of Poor Performance of Boiler-Utilizers During Their Operation," A. D. Akimenko, Engr, 2 pp

"Za Ekon Top" No 12

Discusses reasons of poor performance of boiler-utilizers during their operation. Temperatures losses in connecting bafflers should be considered in designing and during installation of utilizer units. Most efficient heat utilization

[redacted] 64/49T58

USSR/Engineering (Contd) Dec 48

can be achieved by placing utilizer as close as possible to heat source. States that construction of heat conductors should be improved. Indicates methods for eliminating temperatures losses, with tables and graphs.

[redacted] 64/49T58

AKIMENKO, A. D. PA 56/49T41

USSR/Engineering May 49
Steam Condensers
Condensation

"Operation of Condensation Vessels With Sand Filling," A. D. Akimenko, 2½ pp

"Energet Byul" No 5

Points out simplicity and ease of constructing subject type of unit. Shows method for making preliminary calculations of performance, and analyzes limits of equipment's application: establishes range of steam pressures, etc. Does not recommend this type where steam pressure undergoes considerable fluctuation.

[redacted] 56/49T41

[redacted], A.D. i SEVORTSOV, A.A.

27063

Opyt zavoda "Krasnoe Sormovo" po ekonomii topliva. Za ekonomiyu topliva, 1949, No. 8. S. 27-31

SO: LETOPIS' NO. 34

AKIMENKO, A. D.

166T25

USSR/Fuel - Mazut — Sep 50
Furnaces, Metallurgical

"Using the Exhaust Gases of Metallurgical Furnaces to Heat Compressed Air for Atomizing Mazut," A. D. Akimenko, Engr

"Prom Energet" No 9, pp 12-15

Terms use of compressed air for atomization uneconomical. Describes heaters now in use, their design and characteristics, and shows that in the case of metallurgical plants of the old type using 60,000 tons of mazut per year, an economy of

166T25

USSR/Fuel - Mazut (Contd) — Sep 50

1.5 million kwh and 2000-3000 tons of mazut can be achieved by heating compressed air used for atomization to 200°C.

166T25

AKIMENKO, A. D.

PA 195T60

USSR/Metals - Cast Iron, Melting May 51

"Peculiarities of the Thermal Process of Melting Cast Iron in a Cupola Furnace With Application of Oxygen." A. D. Akimenko, Engr, A. A. Skvortsov, Cand Tech Sci, "Krasnoye Sormovo"

"Litey Proizvod" No 5, pp 17-19

Describes and analyzes exptl heats in 2 cupola furnaces of 1,120 mm diam with 3 rows of tuyeres, using oxygen to intensify melting process. Concludes that application of oxygen

195T60

USSR/Metals - Cast Iron, Melting (Contd) May 51

in cupola melting is particularly essential for making special cast irons which require high temp of molten metal for improving quality of castings.

195T60

B·TR

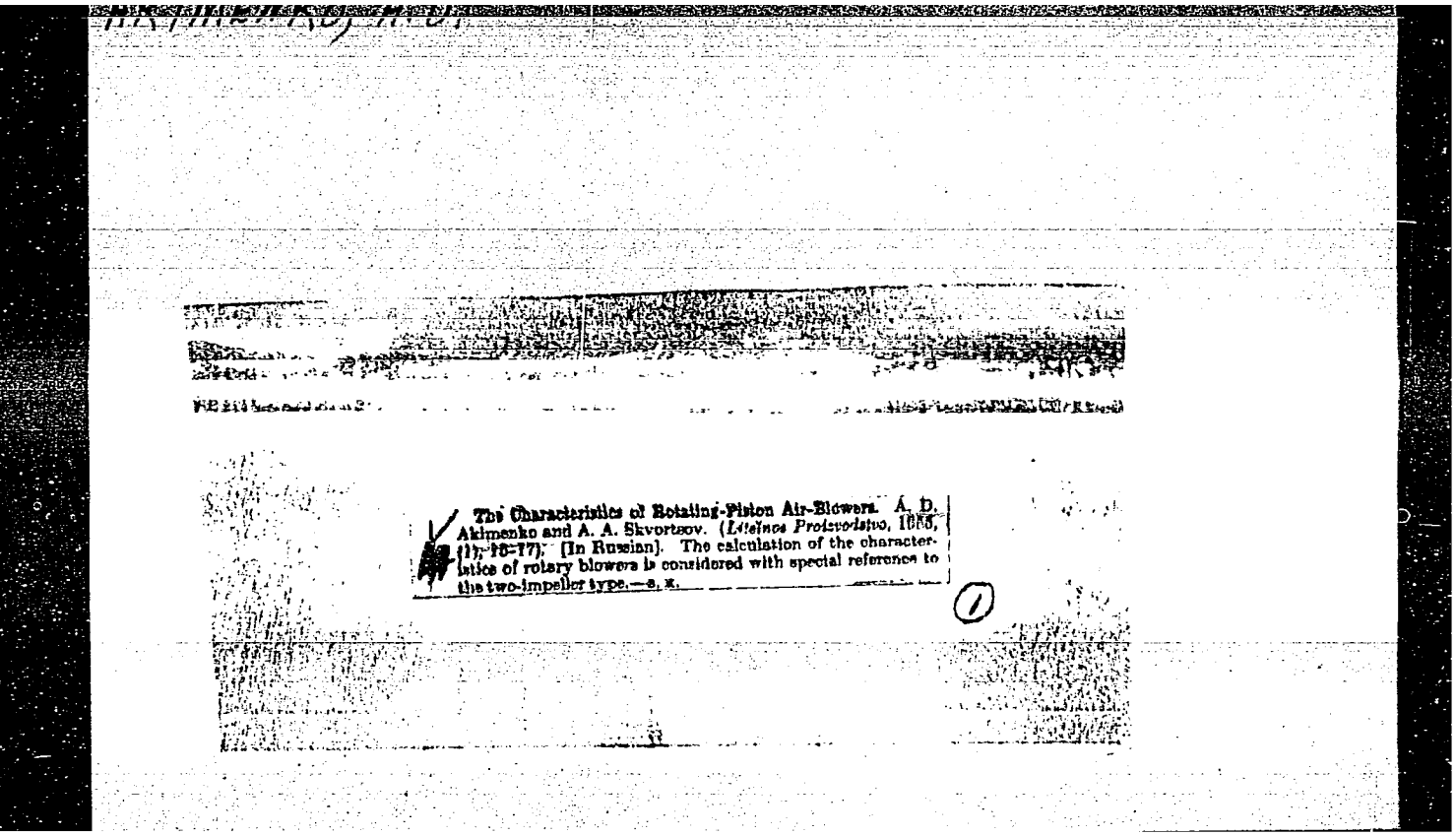
21

9123* Choice of Measuring Units for Standardization of Fuel Consumption of Locomotives for Intrafactory Transportation. (In Russian.) A. D. Akimenko. *Za Ekonomiiu Topliva*, v. 9, Mar. 1952, p. 22-24.

Includes mathematical analysis and graphical interpretation

KARABIN, A.I.; AKIMENKO, A.D., kandidat tekhnicheskikh nauk, retsenzent; LETNEV, B.Ya., inzhener, redaktor; MATVEYEVA, Ye.N., tekhnicheskiy redaktor.

[Power supply of steam and pneumatic hammers] Energetika parovozdushnykh molotov. Moskva, Gos.nauchno-tekhn.izd-vo mashinostroitel'noi lit-ry, 1955. 315 p. (MLRA 8:12)
(Hammers)



The Characteristics of Rotating-Piston Air-Blowers. A. D. Akimenko and A. A. Skvortsov. (*Liteinoe Proizvodstvo*, 1955, (1), 16–17). [In Russian]. The calculation of the characteristics of rotary blowers is considered with special reference to the two-impeller type.—S. K.

(1)

AKIMENKO, A.D.

AID P - 3078

Subject : USSR/Electricity

Card 1/1 Pub. 29 - 12/29

Authors : Akimenko, A. D. and Ye. A. Serov, Engs.

Title : Control of mercury differential manometer

Periodical : Energetik, 7, 17-18, Jl 1955

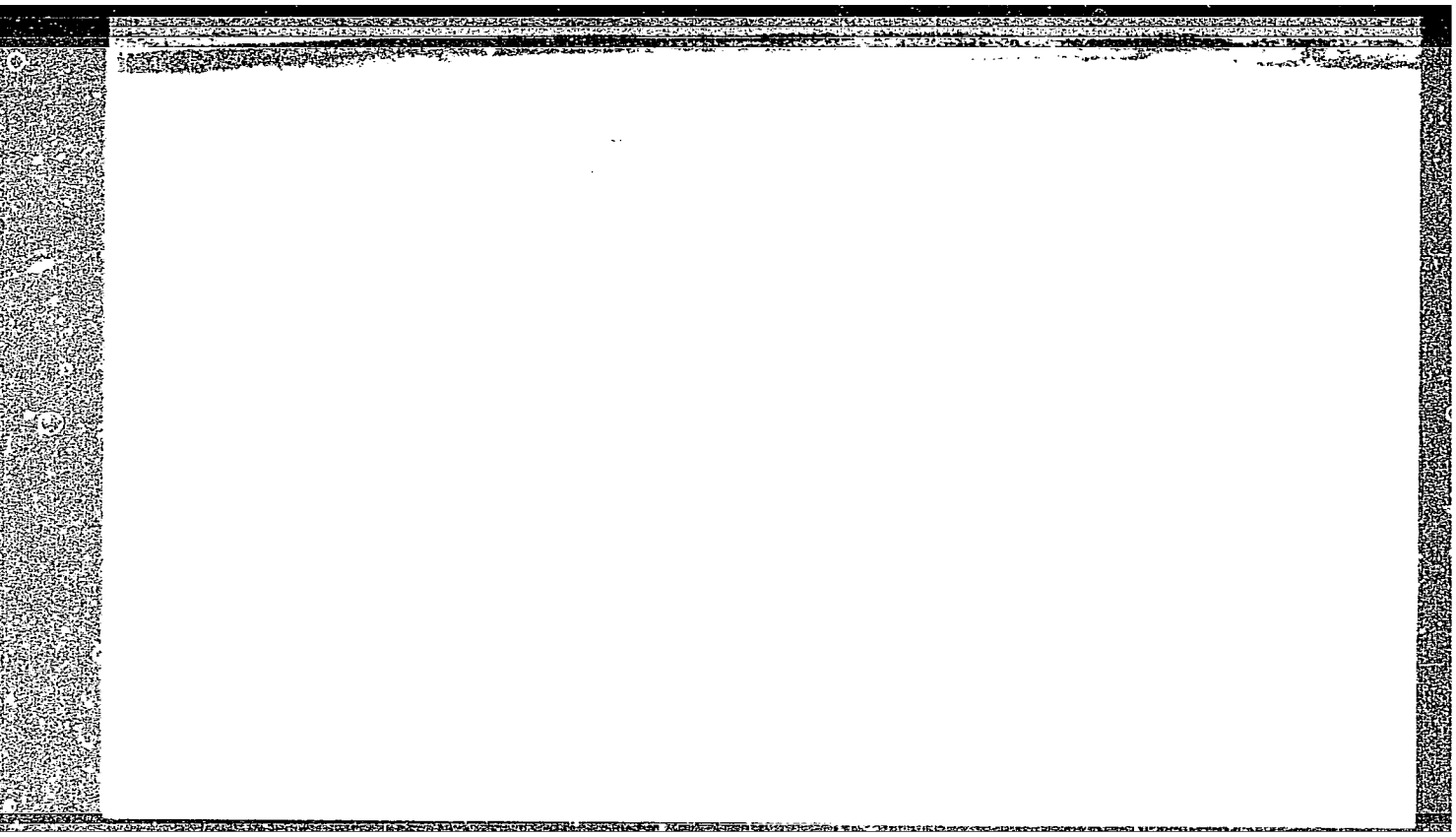
Abstract : Operational controls of differential manometers of the DP and PES types are difficult if made at the place of installation. The author describes an instrument used for testing such manometers under operational conditions. One table, 3 drawings.

Institution : None

Submitted : No date

AKIMENKO, A.D.

Industrial control on the state of a molding machine. Lit.proizv. no.2:10-11 F '56. (Molding machines) (MLRA 9:6)



APPROVED FOR RELEASE: 06/05/2000 CIA-RDP86-00513R000100620016-5"

AKIMENKO, A.D., kandidat tekhnicheskikh nauk.

Upper limit for heating compressed air. Prom.energ. 11 no.7:9-10 Jl '56. (MLRA 9:10)

(Compressed air)

AKIMENKO, A.D., kandidat tekhnicheskikh nauk.

Heat losses in steam mains of industrial establishments. Prom. energ. 11 no.11:14-16 N '56. (MLRA 9:12)

(Steampipes)

AKIMENKO, A.D.

SKVORTSOV, A.A., kandidat tekhnicheskikh nauk; AKIMENKO, A.D.; KOROTKOV, K.P., inzhener.

Processes of solidification and heat loss during continuous casting. Stal' 16 no.10:883-890 O '56. (MIRA 10:9)

1. Zavod "Krasnoye Sormovo" i Gor'kovskiy politekhnicheskiy institut.
(Steel ingots--Cooling) (Solidification)

AKIMENKO, A.D.

18(5) PHASE I BOOK EXPLOITATION SOV/1347

Korotkov, Konstantin Petrovich, Nikolay Pavlovich Mayorov, Aleksey Anotol'yevich Skvortsov, and Anatoliy Dmitriyevich Akimenko

Promyshlennoye primeneniye nepreryvnoy razlivki stali (Industrial Applications of Continuous Casting of Steel) Leningrad, Sudpromgiz, 1958. 150 p. 2,200 copies printed.

Scientific Ed.: Malakhovskiy, G.V.; Ed.: Shaurak, Ye. N; Tech. Ed.: Frumkin, P.S.

PURPOSE: This book is intended for designers and technologists working in the field of the continuous casting of steel. It may also be useful to students at metallurgical institutes and tekhnikums, as well as to engineers and technicians.

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Industrial Applications (Cont.) SOV/1347

COVERAGE: The book gives an account of the experience gained at the "Krasnoye Sormovo" [Shipbuilding] Plant [in Gor'kiy] in the operation of industrial equipment for the continuous casting of steel. It is stated that by 1960 the production of steel in the USSR by this method will increase the annual output of rolled steel by 1,000,000 metric tons, with an expected economy of about 2 billion rubles. Among the advantages cited for this method are the absence of shrinkage cavities and elimination of laborious teeming operations. The "Krasnoye Sormovo" Plant put its continuous-casting installation, said to be the largest of the few existing in the world, into operation in 1955. The plant management is planning another continuous-casting installation, and "many more" Soviet plants are scheduled to be so equipped. The book is based not only on the practice and experience of the "Krasnoye Sormovo" Plant, but also on work done at the Nauchno-issledovatel'skiy institut chernoy metallurgi (Scientific Research Institute of Ferrous Metallurgy) and at the Gor'kovskiy politekhnicheskiy institut (Gor'kiy Polytechnic Institute). No personalities are mentioned. There are no references.

Card 2/6

TABLE OF CONTENTS:

AVAILABLE: Library of Congress

GO/rj
4-16-59

SOV/137-58-10-20651

Translation from: Referativnyy zhurnal, Metallurgiya, 1958, Nr 10, p 47 (USSR)

AUTHORS: Skvortsov, A.A., Akimenko, A.D.

TITLE: A Hydraulic Model Investigation of the Process of Continuous Casting of Steel (Issledovaniye protsessa nepreryvnoy razlivki stali na gidravlicheskoy modeli)

PERIODICAL: Izv. vyssh. uchebn. zavedeniy. Chernaya metallurgiya, 1958, Nı 3, pp 21-26

ABSTRACT: Hydraulic simulation is used to determine the optimum angle of delivery of the stream into the crystallizer mold and the depth to which the stream penetrates into the metal in accordance with the height of the pouring container above the surface of the metal in the mold, when continuous casting of steel is practiced. When the process of casting from a tundish is simulated, the major criteria to be observed are the Weber and Froude criteria. Upon continuous casting of rectangular billets, the employment of tundishes at ~10° to the vertical, offset from the center of the mold, makes it possible to pour with the surface of the metal uncovered. The simulated test shows that the utilization of tundishes at an angle of 20° may erode the solid

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A Hydraulic Model Investigation of the Process (cont.)

skin forming on the edge of the billet opposite to the tundish. A reduction in the height of fall of the stream from 300 to 100 mm results in an insignificant increase in the depth to which the stream penetrates into the metal. When the stream is introduced below the surface of the metal the penetration of the stream almost doubles. Continuous-steel-casting experience at the Krasnoye Sormovo Plant shows the depth of penetration to be 400-460 mm, the distance between the tundish and the surface of the metal in the mold being 300 mm. This leads to the conclusion that it is possible to use molds < 1500 mm in length. Attention is drawn to the danger of reducing the length of the mold when the stream is introduced beneath the surface of the metal.

N.N.

1. Steel--Casting 2. Castings--Crystallization 3. Castings--Test results

Card 2/2

AUTHOR: Akimenko, A.D.

90-58-5-4/10

TITLE: Problem of the Application of Diaphragm-Type Condensate Outlets (K voprosu primeneniya diafragmennykh kondensatootvodchikov)

PERIODICAL: Energeticheskiy Byulleten', 1958, Nr 5, pp 14-16 (USSR)

ABSTRACT: Diaphragm-type condensate outlets are widely used in industrial installations with only small fluctuations of steam pressure. Their operation capacity is dependent on the cross section of the diaphragm, on the reduction of pressure in the diaphragm, and on the specific weight of the condensate. The author admits that calculation of the operational properties by means of the 8 formulas given in the article is rather cumbersome. In Figure 3, a nomogram is given for the determination of the K factor. The K factor expresses the reduction of the operating capacity due to the presence of steam in the supplied condensate. The calculated values correspond to experimental results.
There are 3 figures, and 3 Soviet references.

AVAILABLE: Library of Congress

Card 1/1

1. Steam condensers-Equipment

8(0), 18(3) SOV/112-59-3-4834

Translation from: Referativnyy zhurnal. Elektrotekhnika, 1959, Nr 3, p 75 (USSR)

AUTHOR: Akimenko, A. D., Skvortsov, A. A., and Mayorov, N. P.

TITLE: Peculiarities of Power Consumption by Continuous Steel-Teeming Installations (Osobennosti energopotrebleniya ustanovok nepreryvnoy razlivki stali)

PERIODICAL: Izv. vyssh. ucheb. zavedeniy. Energetika, 1958, Nr 5, pp 60-64

ABSTRACT: Bibliographic entry.

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SOV/133-58-6-8/33

AUTHORS: Akimenko, A.D., Candidate of Technical Sciences, Makushin, A.M., Engineer, Skvortsov, A.A., Candidate of Technical Sciences and Khripkov, A.V. and Shenderov, L.B., Engineers

TITLE: An Experience in a Combination Secondary Cooling of Continuously Cast Steel Ingots (Opyt kombinirovannogo vtorichnogo okhlazhdeniya nepreryvnogo slitka stali)

PERIODICAL: Stal', 1958, Nr 6, pp 509-511 (USSR)

ABSTRACT: The use of water sprayers for the secondary cooling of continuously cast ingots on the "Krasnoye Sormovo" Works was unsatisfactory as a decrease in the intensity of heat removal was effected only slightly (due to a narrow range of the possible control of the consumption of water and unsatisfactory dispersion of water). In order to remove this deficiency, the use of pre-formed, two-phase, water-air mixture was proposed. A description of the set-up for preliminary experiments in which cooling of a specimen heated to 1 000 - 1 050 °C was investigated (Figures 1, 2) is given. The experimental results indicated that the use of a water-air mixture will permit decreasing the consumption of water from 104 to 36 m^3/hr (a 65% decrease). A decrease in the intensity of cooling improved the quality of ingots (Figure 4) in particular

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An Experience in a Combination Secondary Cooling of Continuously Cast Steel Ingots SOV/133-58-6-8/33

by decreasing the number of longitudinal internal cracks, which until then were the main deficiency of ingots continuously cast on the works.
There are 4 figures and 3 Soviet references.

ASSOCIATION: Gor'kovskiy politekhnicheskiy institut (Gorkiy Polytechnical Institute) and Zavod "Krasnoye Sormovo" (Krasnoye Sormovo Works)

Card 2/2 1. Open hearth furnaces--Performance 2. Fuel injectors--Applications 3. Noise--Reduction

AKIMENKO, A.D., kand. tekhn. nauk, dotsent; SKVORTSOV, A.A., kand. tekhn. nauk, dotsent

Investigating heat transfer in crystallizer equipment for continuous steel casting. Izv. vys. ucheb. zav.; chern. met. no.12:45-50 D '58. (MIRA 12:3)

1.Gor'kovskiy politekhnicheskiy institut.
(Steel ingots) (Heat--Transmission)

AUTHORS: ~~Akimenko, A. D.,~~ Candidate of Technical Sciences, SOV/122-58-12-25/32.
Docent, Barykin, V.I., Docent, Skvortsov, A. A.,
Candidate of Technical Sciences, Docent

TITLE: The Economics of Using Electrical Heating in Forging Shops (K voprosu ob ekonomicheskoy effektivnosti primeneniya elektronagreva v kuznechno-pressovykh tsekhakh)

PERIODICAL: Vestnik Mashinostroyeniya, 1958, Nr 12, pp 64-66 (USSR)

ABSTRACT: The authors take up an article in the January 1958 issue of this journal by V.N. Glushkov who suggests that electrical induction heating of parts for forging is uneconomical. They point out that the relative cost of oil or gas fired furnaces versus electrical heating will vary widely in different regions. The cost of oil in roubles per metric ton is given for five different regions (Table 1). The cost of natural gas is quoted at 180 roubles per ton. The cost of electrical energy is given in Table 2. Here, four different groups are quoted, and the basic cost of electricity varies from .005 to .15 roubles per kwh. When installation costs and total expenditure are taken into account the cost per kwh for 4800 hour use at a use factor of 0.8 is found to vary from .06 to .263 roubles according to group. The cost

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The Economics of Using Electrical Heating in Forging Shops

of factory water, necessary for cooling induction heating loops, is also taken into account. Again, there is considerable difference between plants with their own water supply (.053 roubles/metre3) and plants taking 'town' water (.46 roubles/metre3). The specific consumption of electricity per ton of metal heated is quoted between 500 kwh and 600 kwh by different authorities. Remarks are made about the basis for assessing the real quantity of oil used per ton of metal heated. In Table 4, costs per ton of material heated are given for three different cases of heating by oil, and the same cases for heating by induction methods, and also the cost of heating by natural gas. This comparison suggests that, at any rate in the central part of the

The Economics of Using Electrical Heating in Forging Shops

USSR where electricity is cheap, that induction heating can be as cheap or cheaper than oil heating. The cost per ton for heating by natural gas comes out at about three-quarters of that for oil or for electrical heating.

There are 4 tables and 7 references, all Soviet.

AKIMENKO, A.D., kand. tekhn. nauk; GREKK, V.A., inzh.; KASHCHEYEVA, N.P., inzh. KUZMLEV, M.Ya., inzh.; SKVORTSOV, A.A., kand. tekhn. nauk; CHUMAGIN, V.S., inzh.

Utilizing waste nitrogen from oxygen plants as a protective atmosphere for metal heat treatment in furnaces. Vest. mash. 38 no.4: 40-42 Ap '58. (MIRA 11:3)
(Metals--Heat treatment) (Protective atmospheres) (Nitrogen)

18(3) SOV/163-59-2-22/48

AUTHORS: Akimenko, A. D., Skvortsov, A. A.

TITLE: Investigation of the Process of Heat Emission in the Zone of Secondary Cooling in the Plants for Continuous Steel Casting (Issledovaniye protsessa teplootdachi v zone vtorichnogo okhlazhdeniya ustanovok nepreryvnoy razlivki stali)

PERIODICAL: Nauchnyye doklady vysshey shkoly. Metallurgiya, 1959, Nr 2, pp 123 - 130 (USSR)

ABSTRACT: In continuous steel casting, the ingot passes three zones of cooling: 1) Cooling in a crystal agent circumcirculated by water, 2) zone of secondary cooling by spraying with water, 3) air cooling by free convection. The present paper investigates the conditions of the second zone which eliminates 50 - 60% of the total heat. Figure 1 shows the temperature course in the ingot during this treatment. The experiments were carried out on a test stand. Table 1 indicates the cooling methods applied (air, water or air-water mixture). The temperature changes were recorded and the heat-transfer coefficients were computed. Figure 2 shows the changes of the heat-transfer coefficients during the observation time, figure 3 indicates the dependence of the mean heat-transfer coefficient on the specific water consumption. The experiments with pure air cooling (Table 3) proved to be uneconomical due to

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Investigation of the Process of Heat Emission in the Zone of Secondary Cooling in the Plants for Continuous Steel Casting SOV/163-59-2-22/48

a high current consumption for the air supply. The engineers of the "Krasnoye Sormovo" Works suggested a cooling by a two-phase water-air mixture produced in special mixers, which was tested by the Institute mentioned under "Association". The following is ascertained: 1) The method renders possible a continuous supply of the mixture to the nozzles with no separation of phases in the pipelines; 2) the consumption of compressed air is low; 3) the water consumption can be reduced by 35% at the same shape of nozzles; 4) the values of the heat-transfer coefficients of this procedure lie between the values for water cooling and the values for air cooling (Fig 4). The experiments proved the practical applicability of this procedure. There are 4 figures, 3 tables, and 6 Soviet references.

ASSOCIATION: Gor'kovskiy politekhnicheskiy institut (Gor'kiy Polytechnic Institute)

SUBMITTED: May 8, 1958

Card 2/2

AKIMENKO, A.D. (Gor'kiy)

Water consumption characteristics of atomizers. Vod. i san. tekh. no.11: 11-13 N '59. (MIRA 13:3)
(Atomization)

AKIMENKO, A.D.

PHASE I BOOK EXPLOITATION SOV/5383

Anatoliy Dmitriyevich Akimenko, Konstantin Petrovich Korotkov, Nikolay Pavlovich Mayorov, Aleksey Anatol'yevich Skvortsov, and Lev Borisovich Shenderov

Osvoyeniye nepreryvnoy razlivki stali (Mastering the Process of Continuous Steel Casting) Leningrad, Sudpromgiz, 1960. 225 p. 3,700 copies printed.

Scientific Ed.: G.V. Malakhovskiy; Ed.: M.A. Aptekman; Tech. Ed.: R.K. Tsal.

PURPOSE: This book is intended for designers and process engineers of continuous steel-casting plants and for staff members of scientific research organizations engaged in the investigation of the continuous casting process. It may also be used by students specializing in this field of metallurgy.

COVERAGE: The authors discuss results of experience in setting up and putting into operation the first industrial plant for continuous casting of steel at the "Krasnoye Sormovo" Works. Attention is also given to an investigation of the continuous casting process and to the design of the second continuous steel-casting plant which is now under construction at the same works. In 1958 a group of staff members of the Novotul'skiy and Sormovo Works (G.V. Gurskiy, M.D. Gritsun, V.A. Kazanskiy, N.L. Komandin, K.P. Korotkov, N.P. Mayorov,

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N.N. Smel'yakov, and A.V. Khripkov), headed by Academician I.P. Baradin, were awarded the title of Laureate of Lenin's Prize for their work in mastering the continuous steel-casting process. Staff members of the TsNIIChM (Central Scientific Research Institute of Ferrous Metallurgy), the Scientific Research Institute of the former Ministry of the Shipbuilding Industry, the VNIIavtogen (All-Union Scientific Research Institute of the Autogenous Treatment of Metals), and other organizations took an active part in the investigation of the continuous casting process. Heat emission and solidification processes were investigated by the Gor'kiy politekhnicheskiy institut (Gor'kiy Polytechnic Institute). There are 54 references: 52 Soviet, 1 English, and 1 German.

TABLE OF CONTENTS:

S/148/60/000/007/020/023/XX
A161/A033

AUTHORS: Akimenko, A. D., Skvortsov, A. A.

TITLE: Heat transfer in the secondary cooling zone in continuous steel casting.

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy. Chernaya metallurgiya, no. 7, 1960, 54 - 59

TEXT: The Gor'kiy Polytechnic Institute had been commissioned by the Tsentral'nyy nauchno-issledovatel'skiy institut chernoy metallurgii (Central Scientific Research Institute of Ferrous Metallurgy) in 1959 to carry out an investigation of heat transfer in the continuous steel casting process. The experiments had been described by A. D. Akimenko and A. A. Skvortsov. (Ref. 1: Nauchnyye doklady vysshey shkoly. Metallurgiya, 1959, No. 2); they consisted in the jet cooling of the ingot specimen by water, compressed and fan air, and an air-water mixture on a test stand without support rollers. The developed method of determining the heat transfer factor was checked in a continuous casting installation at the "Krasnoye Sormovo" plant. The heat transfer was

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Heat transfer in the secondary ....

measured in the secondary cooling zone, and the heat transfer drop through the supporting rollers was taken into account by the factor

$$K_{evap} = \frac{\alpha_{actual}}{\alpha_{calculated}} .$$

The K_{evap} was determined in the real working unit and in a stand fitted with support rollers. The real heat transfer in the working unit was calculated by the heat volume removed by cooling water from the ingot:

$$\alpha_{actual} = \frac{G[(1 - x) \cdot (t_2 - t_1) + x(640 - t_1)]}{F(t_{surf} - t_1)} \text{ Kcal/m}^2 \cdot \text{h} \cdot {}^\circ\text{C}, \quad (1)$$

where G is water consumption measured by flow meter, kg/h; t_2 and t_1 - the end and the start water temperature, °C; F - cooled surface, m^2; t_{surf} - mean surface temperature °C; $x = \frac{D}{G}$ - the relative water quantity turning into steam during the secondary cooling process (D - the absolute quantity of formed steam, kg/h). The measurement results were (the mean of 11 tests): 1) Ingot

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Heat transfer in the secondary ...

stretching speed $v = 0.7$ m/min; 2) water temperature on the input $t_1 = 25^\circ$; 3) water temperature difference $\Delta t = t_2 - t_1 = 25^\circ$; 4) specific water consumption

$$\frac{Q_B}{F} = 22 \text{ m}^3/\text{m}^2\text{h};$$

5) mean temperature of cooled surface $t_{surf} = 630^\circ$; 6) mean actual heat transfer factor $\alpha_{actual} = 1500$ Kcal/m$^2 \cdot$ h$^\circ$C; 7) evaporation factor $x = 2.8$ %. The evaporation factor increased with a reducing specific water consumption and reached 12 % and higher at 5 m^3/m^2/h. The knowledge of the x factor is of practical interest for the designing of fan systems for continuous casting units. Thus it is planned to build a special installation for the condensation of steam at the new unit under construction at the Stalinskiy metallurgicheskiy zavod (Stalino metallurgical plant). The $K_{исп}$ (K_{evap}) was also determined in the laboratory, on a stand imitating a real unit. The dimensionless center temperature and the Fourier criterion were determined by a temperature diagram, and the Bio (Russian transliteration) criterion by the known D. V. Budrin diagrams (Ref. 1). The determined $K_{evap} = f\left(\frac{Q_B}{F}\right)$ is shown in

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Heat transfer in the secondary ....

Figure 1. The Novotul'skiy metallurgicheskiy zavod (Novotula Metallurgical Plant) uses the roller cooling method without jet developed by TsNIIChM, consisting in pouring water on the supporting rollers from special collectors under slight pressure. This method was also studied on a laboratory stand. The results are given (Figure 2). The water consumption is lower with this method, but the cooling intensity cannot be sufficiently controlled. The effect of the spacing of the support rollers was studied, and the K_F factor (cooled surface utilization factor) was determined:

$$K_F = \frac{S - d}{S} \qquad (3)$$

where S - roller pitch; d - diameter of support rollers. The actual K_F value varies in the operating units and the new ones under construction:

	d	S	K_F
at "Krasnoye Sormovo"	110	130	0.153
at the Novotula Metallurgical Plant	110	150	0.265
in units under construction	110-130	140-210	0.215-0.238.

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Heat transfer in the secondary ....

The results of the stand tests are given (Figure 3). The formula used for the recalculation of stand test results for the full-scale roller cooling unit is

$$\alpha_2 = \alpha_1 \frac{\left(\frac{V}{F}\right)_2}{\left(\frac{V}{F}\right)_1} \cdot \frac{\tau_1}{\tau_2} \cdot \frac{\Delta i_2}{\Delta i_1} \cdot \frac{\gamma_2}{\gamma_1} \cdot K_p K_{evap} \qquad (4)$$

where α_2 - the heat transfer factor in operating units, Kcal/m^2h °C; α_1 - the heat transfer factor during the cooling of test specimen, determined by Figure 2; $\left(\frac{V}{F}\right)_2, \left(\frac{V}{F}\right)_1$ - the respective relation of volume to surface of the specimen and the ingot; τ_1, τ_2 - the cooling time of the specimen and the ingot; γ_2, γ_1 - specific gravity of the specimen and the ingot; $\Delta i_2, \Delta i_1$ - heat content variation in 1 kg metal in the secondary cooling zone and on the stand (full data for calculating the Δi value are given in Ref. 1). The correction factor for water pressure before the jets is calculated by the emphirical formula

$$p = \left(\frac{P}{0.8}\right)^{0.25} . \qquad (5)$$

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Heat transfer in the secondary ....

For cooling through rollers without nozzles, $K_p \cong 1.0$, and K_{evap} is found from Figure 1 (K_p is still to be determined with more accuracy, it may be assumed to be $\cong 1.0$ in first approximation). The method permits the determination of basic data for the designing of new continuous casting units. There are 3 figures and 2 Soviet-bloc references.

ASSOCIATION: Gor'kovskiy politekhnicheskiy institut (Gor'kiy Polytechnical Institute)

SUBMITTED: June 15, 1959

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S/182/60/000/011/012/016
A161/A029

AUTHORS: Akimenko, A.D., Kuzelev, M.Ya., Skvortsov, A.A.

TITLE: Experimental Investigation Into Heating of Steel Blanks for Forging and Stamping in Molten Salts

PERIODICAL: Kuznechno-shtampovochnoye proizvodstvo, 1960, No.11, pp.40-42

TEXT: Information is given on experiments at the "Krasnoye Sormovo" works with forging blank heating in molten salt bath heated to 1,300°C. Two salt mixtures were used: a) 30% $BaCl_2$ and 70% NaCl and b) 70% $BaCl_2$ and 30% NaCl. Cylindrical specimens 10, 20 and 30 mm in diameter were heated to 1,200-1,250°C. The results confirmed the data obtained by LPI and NZL (Ref. 1). The heating time is 2-3 times shorter than in a chamber furnace; heat losses from the bath surface can be reduced to minimum by using bath covers and covering the bath surface with a layer of graphite powder. The heating costs are approximately the same as in furnaces but the salt bath has technological advantages. The power characteristic of the СП-2 (SP-2) electrode bath is given (Fig. 1); its efficiency at the rated work capacity of 30 kg/hour is only 20-25% and decreases abruptly with

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Experimental Investigation Into Heating of Steel Blanks for Forging and Stamping in Molten Salt

reduced load. Special baths with higher efficiency (35-40%) are possible in principle. The heat release coefficient from the liquid salt to the metal was determined in the following manner. Using the temperature diagram (Fig. 2) in the specimen center,

$$\theta = \frac{(t_{med} - t_{cent})_1}{(t_{med} - t_{cent})_{init}} \qquad (1)$$

where $(t_{med} - t_{cent})_1$ is the real (varying) difference of the medium and the specimen center temperature, and $(t_{med} - t_{cent})_{init}$ the initial difference. [Abstractor's note: subscripts $_{med}$ (medium), $_{cent}$ (center), $_{init}$ (initial) are translations from the Russian $_{ср}$ (sreda), $_{ц}$ (tsentr), $_{нач}$ (nachal'nyy)]. Knowing the θ values and the Fourier criterion (Fo), the known D.V. Budrin diagrams may be used for finding the Bio (bi)

 criteria, but in view of low Bi

Experimental Investigation Into Heating of Steel Blanks for Forging and Stamping in Molten Salt

values in the experiments (10 and 20 mm blank diameter), a formula from Ref. 2 was used for the calculation:

$$\theta = e^{-2FoBi} \qquad (2)$$

Using the obtained Bi value, the mean heat release coefficient α_m is found in the interval from the initial to the final temperature of the center (or the surface):

$$\alpha_m = \frac{1}{\tau_2 - \tau_1} \int_{t_{init}}^{t_{fin}} \alpha_{true} d\tau \qquad (3)$$

where $(\tau_2 - \tau_1)$ is the heating efficieny. [Abstractor's note: Subscripts fin (final) and true (true) are translations from the Russian конечный (konechnyy) and истинный (istinnyy)]. The mean values of the physical material constants in the given temperature interval must be substituted for calculation of

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Experimental Investigation Into Heating of Steel Blanks for Forging and Stamping in Molten Salt

the Bi and Fo criteria. The determined mean heat release coefficient values are shown (Fig. 3) in the form of the relation $\alpha_m = f(t_{mean})$. [Abstractor's note: Subscript $_{mean}$ is a translation from the Russian $_{ср}$ (sredniy)]. (The diagram includes data obtained by V.F. Kopytov (Ref. 3) and D.V. Vishnyakov (Ref. 4). Vishnyakov obtained a higher heat release coefficient using pure $BaCl_2$.) The heating time for blanks can be calculated knowing the heat release coefficient. The calculated time (τ) for cylindrical blanks from 40X (40Kh) steel at α_m=500 kcal/m^2·hr·degree is given (Table 2):

Heating temperature °C	Time in seconds for blanks diameters 30 mm	20 mm	10 mm
1,200	160	110	56
1,100	90	60	30
1,000	70	47	23

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A161/A029

Experimental Investigation Into Heating of Steel Blanks for Forging and Stamping in Molten Salt

The theoretical calculation with convective heat exchange formulae in liquid media gives exaggerated figures, which can be explained by the thermal resistance of the solidified salt layer. The following conclusions are drawn: 1) the method is applicable to practice and has technological advantages; 2) the mean heat release coefficient from the bath to the metal in $NaCl + BaCl_2$ at a bath temperature of 1,200-1,350°C is α_m = = 500 $kcal/m^2 \cdot hour \cdot degree$; 3) the obtained data make possible the calculation of heating process variables. Engineers N.P. Kashcheyeva, V.M. Kop'yev and G.N. Khoperskaya took part in the experiments. There are 4 figures and 5 Soviet references.

Card 5/5

S/148/61/000/010/001/003
E111/E435

AUTHORS: Akimenko, A.D., Skvortsov, A.A.

TITLE: Heat transfer in moulds for continuous casting of steel

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy. Chernaya metallurgiya 4 no.10, 1961, 29-36

TEXT: The authors give results of their further investigations on heat transfer in continuous-casting moulds for steel. Simultaneous solution of equations for the heat flux from the wall to the cooling water and in the copper wall, combined with the equation for heat flux from the liquid metal to the wall, gives a system independent of the outer temperature of the wall. Fig.1 shows the overall heat transfer coefficient in kcal/m^2 hour deg (allowing for the extent to which the lubricant burns away on the walls) as functions of the water flow rate at the wall (m/sec); curve 1 relates to a turbulent, curve 2 to a laminar boundary layer. These results, those obtained on a hydraulic model (Ref.3: A.A.Skvortsov, A.D.Akimenko, Izv VUZ Chernaya metallurgiya, no.3, 1958) and others indicate that for the direct-contact zone, the overall heat transfer coefficient is 1600 to 2000 kcal/m^2 hr $^{\circ}$C.

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Heat transfer in moulds ...

The main heat removal occurs in the second zone, through the gap between the skin and the mould wall. The gap width δ' is found from the equation

$$\delta' = 0.5k_{lin}\left[t_{liq} - (t_{liq} + t_{surf})0.5\right] l_o \varphi \qquad (10)$$

where k_{lin} is the coefficient of linear expansion of the steel; t_{liq} its crystallization temperature, °C; t_{surf} the crust surface temperature; l_o the initial length of the side perpendicular to the gap walls, m; φ a coefficient allowing for other factors. The equation also enables the limiting taper of the mould to be calculated: this is shown in Fig.3 as a function of the billet surface temperature as it leaves the mould. The authors used a hydraulic integrator to find the billet surface temperature along the mould for mould length of 1000, 1250 and 1500 mm and withdrawal rates of 0.6, 0.7 and 0.8 m/min. At the same time, heat balances for forty heats on 420 x 175 mm slab moulds at the "Krasnoye Sormovo" works were compiled. Mould lengths were 1250 (shortened) and 1500 mm (standard) with mould water flows of 118000 and 121000 kg/hour. The average values of

Heat transfer in moulds ...

the heat flux and heat transfer coefficient in the mould were calculated. A more refined method than used previously was employed for the calculation of the heat transfer coefficient between the mould wall and cooling water. This was done because of discrepancies between calculated and observed values of the overall heat transfer coefficient. Examination of results obtained by the authors by this method in 1958-1959 leads them to the following conclusions: 1) a reduction in mould length to 1250 mm brings about an increase in the heat transfer coefficient of approximately 11%; 2) when automatic lubrication is adopted the value of the coefficient falls somewhat because the hydrogen content in the gases in the gap decreases (due to lower paraffin consumption and a higher degree of combustion); 3) the use of oval and convex shapes also leads to some reduction, due evidently to a more rigid skin and consequently a bigger average gap; 4) the controlling factors for heat transfer in the mould are mould length and billet withdrawal speed; when these are constant other factors cause a change in the coefficient by not more than 10%.
The authors give a nomogram for approximate calculation of the

Heat transfer in moulds ...

heat transfer in the mould. A.I.Veynik is mentioned in connection with his work on heat transfer coefficients. There are 8 figures and 9 Soviet-bloc references.

ASSOCIATION: Gor'kovskiy politekhnicheskiy institut
(Gor'kiy Polytechnical Institute)

SUBMITTED: November 25, 1960

Card 4/5 4

AKIMENKO, A.D.

Consideration of the efficiency of piston air compressors.
Prom. energ. 16 no.2:23-25 F '61. (MIRA 14:3)
(Air compressors)

AKIMENKO, A.D., dotsent, kand.tekhn.nauk; SKVORTSOV, A.A., doktor tekhn.nauk

Capacity of water sprayer nozzles for continuous steel casting equipment. Stal' 21 no.2:124 F '61. (MIRA 14:3)
(Continuous casting) (Metallurgical furnace—Cooling)

ZHELTOV, N.S., inzh.; AKIMENKO, A.D., dotsent, kand.tekhn.nauk

Use of atomized fuel oil in metallurgical furnaces. Stal' 21 no.2:185-188 F '61. (MIRA 14:3)

1. Kulebakskiy metallurgicheskiy zavod i Gor'kovskiy politekhnicheskiy institut.
(Metallurgical furnaces) (Oil burners)

AKIMENKO, A.D.; KUZELEV, M.Ya.; SKVORTSOV, A.A.; KHOLSHCHEVNIKOV, A.Ya.

Heating blanks for forging and die stamping in a nonoxidizing heating compartment furnace. Kuz.-shtam. proizv 4 no.6:40-42 Je '62. (MIRA 15:6)

(Furnaces, Heating)

AKIMENKO, A.D., kand.tekhn.nauk, dotsent

Performance of a pneumatic device with heating of the air in the compressor. Izv. vys. ucheb. zav.; energ. 5 no.1:105-110 Ja '62. (MIRA 15:2)

1. Gor'kovskiy politekhnicheskiy institut. Predstavlena kafedroy metallurgicheskikh i nagrevatel'nykh pechey.
(Pneumatic tools)

AKIMENKO, A.D.; RUKAVISHNIKOV, L.G.; SKVORTSOV, A.A., doktor tekhn. nauk, otv. red.; KOZYULINA, R.M., red.

[Temperature measurements; laboratory work on the course "Control and automation of technological processes"] Izmerenie temperatur; laboratornyi praktikum po kursu "Kontrol' i avtomatizatsiia tekhnologicheskikh protsessov." Gor'kii, Gor'kovskii politekhn. in-t, 1963. 67 p. (MIRA 17:3)

AKIMENKO, A.D.

Measuring the rate of convective flow of liquid metal by means of hydraulic models. Izv. vys. ucheb. zav.; chern. met. 6 no.6:179-183 '63. (MIRA 16:8)

1. Gor'kovskiy politekhnicheskiy institut.
(Liquid metals—Hydrodynamic properties) (Hydraulic metals)

AKIMENKO, A.D., kand. tekhn. nauk

Characteristics of atomizers in their operation on a water-air mixture. Vod. i san. tekh. no.4:4-6 Ap '64 (MIRA 18:1)

S/0182/64/000/004/0037/0038

ACCESSION NR: AP4034599

AUTHORS: Akimenko, A. D.; Kozlov, A. I.; Skvortsov, A. A.

TITLE: Investigation of heating steel objects in molten glass

SOURCE: Kuznechno-shtampovochnoye proizvodstvo, no. 4, 1964, 37-38

TOPIC TAGS: steel, steel heating, molten glass, thermocouple PP, potentiometer EPP 09 M, heat convection, steel U8, steel 35, Fourier criterion

ABSTRACT: Results obtained in experimental heating of steel objects in molten glass prior to forging and stamping are discussed. Samples were held in chamotte crucibles and were heated at 1150-1250C in a silicon carbide furnace. The temperature at the center of a sample was measured with a thermocouple PP connected to an electronic potentiometer EPP-09-M. Samples were made of steel 35 and steel U8 and were either 12 or 25 mm in diameter. The glass consisted of 72% SiO_2, 14.2% Na_2O, 7% CaO, 4% MgO, 2.8% Al_2O_3. Dimensionless center temperature and Fourier number were determined from the temperature diagrams, while D. V. Budrin's charts or the formulas for thin plates (at a low Bi concentration) provided the coefficient of heat exchange. This coefficient proved similar to that obtained in air at 1180C. It dropped at the beginning of heating due to the formation of a viscous glass layer

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ACCESSION NR: AP4034599

on steel and increased with the temperature after this layer disappeared. As the temperature differential between steel and glass diminished, the coefficient dropped again. According to the preliminary calculations, this coefficient may be found as $\alpha_{conv} = c \sqrt[4]{\Delta t}$ Kcal/m^2 · hr · degree, where $c \approx 110$-130. A layer of glass which originates during cooling prevents the oxidation of steel and may be used as lubricant in pressure working. As was stated by L. K. Kovalev (Steklo kak smazka pri goryachey deformatsii metallov. Byulleten' Gosudarstvennogo Nauchno-issledovatel'skogo instituta stekla, 1961, No. 1), this layer slows down the cooling process. This effect, however, is very small. The loss of metal volume, suffered in the course of heating, was found to be caused mainly by the decomposition of the oxide scale. Orig. art. has: 4 figures, 1 table, and 1 formula.

ASSOCIATION: none

SUBMITTED: 00

SUB CODE: MM NO REF SOV: 005 ENCL: 00

OTHER: 000

Card 2/2

AKIMENKO, A.D.

Characteristics of film boiling in water surface cooling. Inzh. fiz. zhur. 7 no.6:32-34 '64. (MIRA 17:12)

1. Politekhnicheskiy institut imeni A.A. Zhdanova, g. Gor'kiy.

L 15152-65 EWP(e)/EWT(m)/EWA(d)/EWP(t)/EWP(k)/EWP(b) Pf-4/Pq-4 WH/
JD/HW/WB
ACCESSION NR: AP4049120 S/0182/64/000/011/0037/0039

AUTHOR: Akimenko, A. D.; Kozlov, A. I.; Skvortsov, A. A.

TITLE: Certain problems in using molten glass for the oxidation-free heating of steel billets

SOURCE: Kuznechno-shtampovochnoye proizvodstvo, no. 11, 1964, 37-39

TOPIC TAGS: steel, heating, molten glass, oxidation free heating, lubricant, forging die, die

ABSTRACT: Experiments in the use of molten window glass as the heating medium and lubricant in steel forging have shown that in the process of heating the steel, the molten glass dissolves the iron oxide. The iron oxide stimulates crystallization in the glass and narrows the temperature range in which it retains its optimal viscosity (140—260 poise). When the iron content of the glass bath exceeds 12—14%, the glass layer on the billet will crystallize at temperatures as high as those of the forging range, causing intensive wear of the forging dies. Under certain conditions the iron content can

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L 15152-65
ACCESSION NR: AP4049120

be increased to 18—20% without any adverse effects. The decarbonization of metal heated in molten glass was found to be local and dependent upon the duration of the heating. Only with prolonged heating does the decarbonization extend to the whole surface of a heated object. Orig. art. has: 5 figures.

ASSOCIATION: none

SUBMITTED: 00	ENCL: 00	SUB CODE: MM, MT
NO REF SOV: 005	OTHER: 000	ATD PRESS: 3144

Card 2/2

AKIMENKO, A.D.

Specific features of heat loss during spray and jet cooling of heated surfaces. Metalloved. i term. obr. met. no.12:18-21 D '64 (MIRA 18:2)

1. Gor'kovskiy politekhnicheskiy institut.

AKIMENKO, A.D.

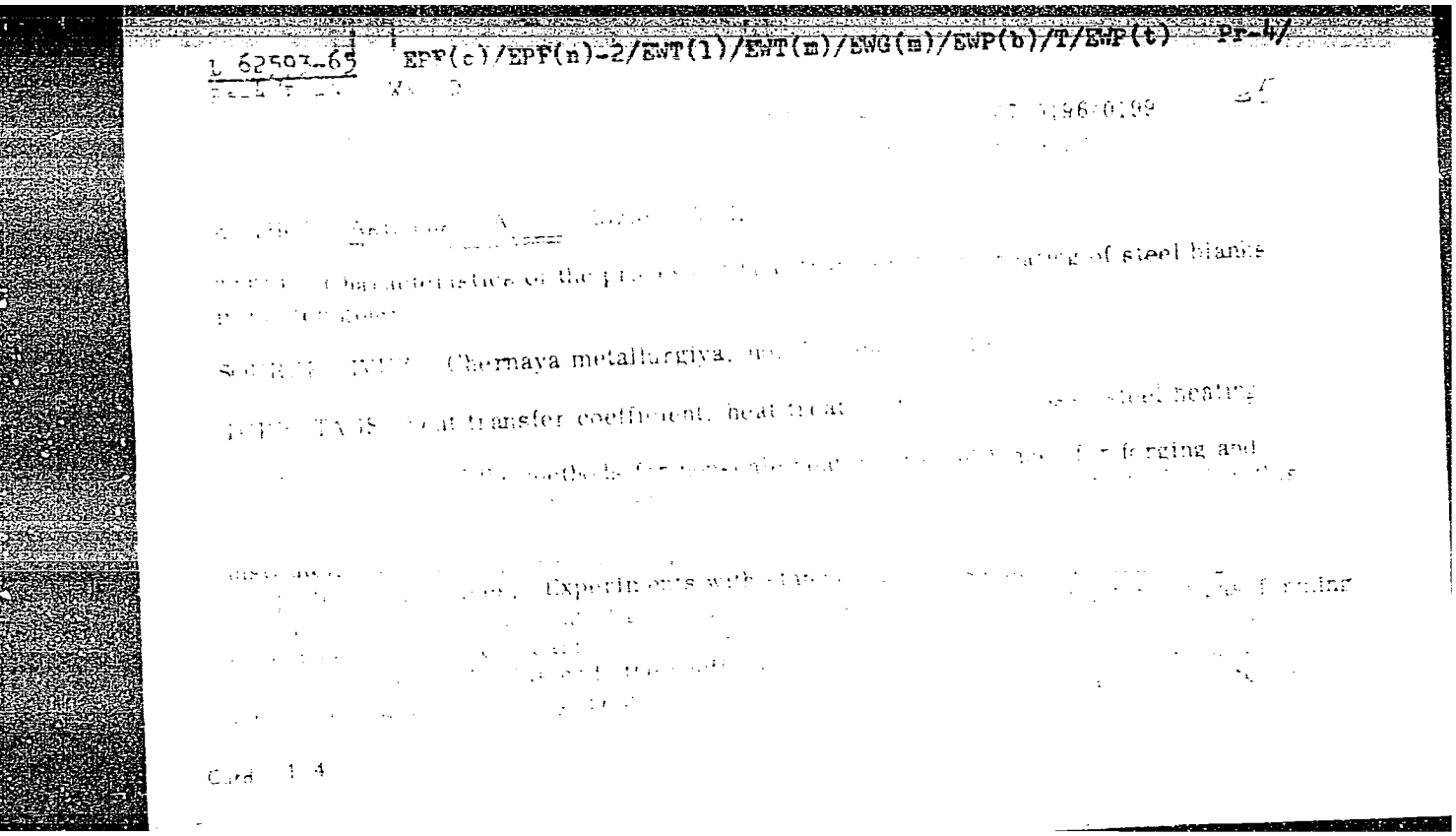
Generalized methods of calculating heat release in the zone of secondary cooling in continuous steel casting equipment. Izv. vys. ucheb. zav.; chern. met. 8 no.1:155-158 '65 (MIRA 18:1)

1. Gor'kovskiy politekhnicheskiy institut.

AKIMENKO, A.D.; ASTROV, Ye.I.; SKVORTSOV, A.A.; POLUSHKIN, N.A.; KLIPOV, A.D.

Effect of the intensity of secondary cooling on the quality of continuous casting. Stal' 24 no.12:1088-1089 D '64. (MIRA 18:2)

1. Gor'kovskiy politekhnicheskiy institut im. Zhdanova, TSentral'nyy nauchno-issledovatel'skiy institut chernoy metallurgii imeni I.P. i Gor'kovskiy metallurgicheskiy zavod.



L 62503-65 EPF(c)/EPF(n)-2/EWT(l)/EWT(m)/EWG(m)/EWP(b)/T/EWP(t) Pr-4/

...of steel blanks

...Chernaya metallurgiya, ...

...heat transfer coefficient, heat ... steel heating

... for forging and

... Experiments with ... the forging

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$$\theta = \frac{t_{cp} - t_n}{(t_{cp} - t_0)_{max}} e^{-2Fo\,Bi}$$

where $(t_{cp} - t_n)$ is the actual (variable) difference between the temperature of the medium [illegible] of the specimen, t_{cp} [illegible] corresponding initial temperature

$$Bi = -\frac{\ln \theta}{2Fo}. \qquad (2)$$

From Bi, the average heat transfer coefficient α_m was obtained for the range from the [illegible] temperature of the specimen [illegible] used to calculate

experiments were treated by using the criterial relation Nu = [illegible], characteristic

L 62595-65

ACCESSION NR: AP5018183

of heat transfer associated with free convection in molten media. Orig. art. has: 5 figures and 3 formulas.

ASSOCIATION: Gor'kovskiy politekhnicheskiy institut (Gor'kiy Polytechnic Institute)

SUBMITTED: 22Mar65 ENCL: 00 SUB CODE: MM, TD

NO REF SOV: 007 OTHER: 001

3/4

Card

L 62593-65

ACCESSION NR: AP5018183

ENCL: 01

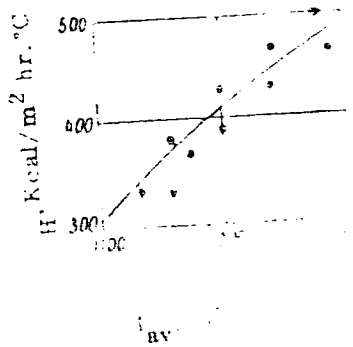

Fig. 1. α_H vs. the temperature of molten glass

4 4

SKVORTSOV, Aleksey Anatol'yevich, prof., doktor tekhn. nauk;
AKIMENKO, Anatoliy Dmitriyevich, dots., kand. tekhn. nauk;
KUZELOV, Mikhail Yakovlevich, dots.

[Heating units] Nagrevatel'nye ustroistva. Moskva, Vysshaia shkola, 1965. 443 p. (MIRA 18:12)

L 23057-66 EWP(e)/EWT(m)/EWP(w)/T/EWP(t) JD/WH

ACC NR: AP5028996 SOURCE CODE: UR/0182/65/000/009/0037/0038

61
60
B

AUTHOR: Akimenko, A. D.; Kozlov, A. I.; Skvortsov, A. A.

ORG: none

TITLE: Features of the heating of steel blanks in molten glass

SOURCE: Kuznechno-shtampovochnoye proizvodstvo, no. 9, 1965, 37-38

TOPIC TAGS: molten glass, glass, metal heat treatment, carburization

ABSTRACT. The article is a rebuttal of the critique offered by Ye. G. Shadek in the same issue of Kuznechno-shtampovoye proizvodstvo, p 36. It is admitted that Shadek is right in pointing to the considerable carburization occurring during the initial experiments of the authors, but such carburization was of a local rather than integral character. Further, owing to the inhomogeneity of the metal, a large number of complex multi-electron elements forms at the surface. Fracture occurs chiefly along grain boundaries, with transition of the anode Fe to the melt, following the reaction $Fe-2e = Fe^{+2}$ and release of gaseous constituents at the cathode. Hence, there is reason to believe that, contrary to Shadek's assertion, the electrochemical interaction between the glass melt and metal occurs in any case and not solely when the Na_2O content of glass is less than 25%. It is shown that weight loss

Card 1/2 UDC: 621.783.2